B. Remarks

Claims 1-7 are pending in the subject application, of which claims 1, 6, and 7 are in independent form. Reconsideration of the present claims is expressly requested.

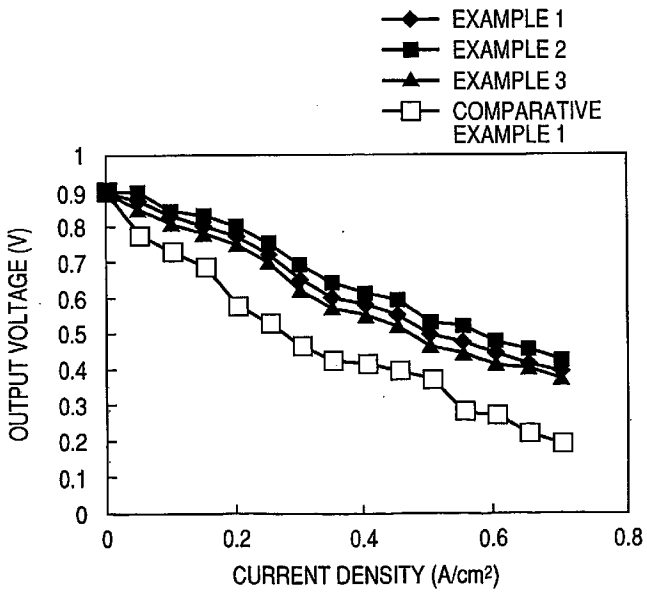
Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as being allegedly obvious from WO 02/33709 (Ito) and WO 03/041091 (Nomura) in view of WO 2005/001037 (Li). The grounds of rejection are respectfully traversed.

Prior to addressing the merits of rejection, Applicants would like to briefly discuss some of the features of the presently claimed invention. That invention, in pertinent part, is related to an electrolyte membrane comprising a siloxane-based polymer and a method for its production. Specifically, the membrane is formed by vinyl polymerization of a silane compound having (meth)acrylate functional group or a hydrolysis product thereof and a (meth)acrylate compound having a phosphate group, followed by siloxane crosslinking.

The siloxane-based polymer electrolyte membrane of the present invention shows not only an improved heat resistance, but also an enhanced conductivity compared with a like polymer electrolyte membrane containing no siloxane crosslinking. This is demonstrated by the data presented in the present application in Examples 1 to 4 and Comparative Example 1.

These differences are also graphically illustrated in Fig. 2. In particular, Fig. 2 shows a voltage-current relationship in the cells utilizing the electrolyte membranes of Examples 1 to 3 and the electrolyte membrane of Comparative Example 1:

FIG. 2



The fuel cells in accordance with the present invention (Examples 1-3) provide stable output up to 0.6 A/cm^2. The fuel cell in Comparative Example 1 provides a lower current.

In sum, the siloxane-based polymer of the present invention shows a high proton conductivity over wide ranges of temperature and humidity and has an excellent resistance to water and methanol. Thus, it provides a significant improvement over conventional polymers.

Ito discloses an acrylic polymer containing a phosphate group as an electrolyte. However, as acknowledged by the Examiner, Ito does not disclose or suggest the acrylic polymer containing a siloxane component. Thus, Ito pertains to conventional technology, such as that described in Comparative Example 1 and shown to be inferior to the presently claimed invention.

Nomura cannot cure the deficiencies of Ito. Nomura discloses a siloxane-based polymer electrolyte membrane containing siloxane crosslinking, but the electrolyte membrane does not have a portion formed by vinyl polymerization of a silane compound

having a (meth)acrylate functional group or a hydrolysis product thereof and a (meth)acrylate compound having a phosphate group. Furthermore, this reference fails to disclose or suggest that if siloxane crosslinking is implemented in the context of Ito, an improvement in electrical properties as shown in Examples 1-4 and Comparative Example 1 in the present application can be achieved. Therefore, the unexpectedly superior results presented in the specification rebut any presumption that it would have been obvious to implement siloxane crosslinking in Ito based on the teachings of Nomura.

Li also fails to supplement Ito and Nomura for at least the same reasons. Li, at most, discloses grafting a thermoplastic polymer with some classes of silane compounds. These silane compounds are directly modified with a conductive component, such as H_3PO_4. Thus, the polymer structure in Li is completely different from the polymer structure of the present invention, and there is no disclosure or suggestion that siloxane crosslinking of components as recited in the present claims can lead to superior electrical properties as demonstrated by Examples 1-4 and Comparative Example 1. Again, the unexpectedly superior results rebut any presumption that it would have been obvious to implement siloxane crosslinking as claimed.

Accordingly, Applicants respectfully submit that the cited documents, whether considered separately or in any combination, do not disclose or suggest all of the presently claimed elements.

Wherefore, withdrawal of the outstanding rejections and passage of the application to issue are respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,

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